Now it seems to us that whether the triangles are uniformly distributed on the semi-circumference or not is of no concern in the solution of the problem. The question is (1), how many right triangles are there whose hypotenuses are a; and (2), what is the area of each one of these triangles? Having found the numbers answering to these questions, we divide the sum of the areas of the triangles by the number of triangles, according to the principle of *Mean Value*, and get the required result. The *sum* of the areas of the triangles is easily found by the aid of the Calculus and the number of triangles is equal to the semi-circumference of a circle whose diameter is a. This is, in our opinion, the correct solution and agrees with II. above. All of the above solutions are, doubtless, correct from the stand-points of the authors, but the stand-points of some must be wrong. As it is the object of the MONTHLY to aid in the establishment of sound principles in all departments of Mathematics, we shall be pleased to publish, in the next issue, brief notes on these solutions from various contributors. [EDITOR.]

PROBLEMS.

33. **Proposed by F. P. MATZ, M. Sc., Ph. D., Professor of Mathematics and Astronomy in Irving College, Mechanicsburg, Pennsylvania.**

Find the average area of all regular polygons having a *constant* apothem.

34. **Proposed by B. F. FINKEL, A. M., Professor of Mathematics, Drury College, Springfield, Missouri.**

Two points are taken at random on the circumference of a semi-circle. Find the chance that their ordinates fall on either side of a point taken at random on the diameter.

DIOPHANTINE ANALYSIS.

Conducted by J. M. COLAW, Monterey, Va. All contributions to this department should be sent to him.

DIOPHANTUS' EPITAPH.

Hic Diophantus habet tumulum, qui tempora vitae
Illius mira denotat arte tibi,
Egit sextantem juvenis; languine malas
Vestire hinc coepit parte duodecima.

Septante uxori post haec sociatur, et anno
Formosus quinto nascitur inde puer.

Semissem aetatis postquam attigit ille paternae
Infelix subita morte peremptus obit.
Quatuor aestates genitor lugere superstes
Cogitur: hinc annos illius assequere.

An Equation for the "Sum of Squares equal a Square" by R. J. ADCOCK, Larchland, Illinois.

The following identical equation for the sum of squares=a square, I have not seen published. If $u=x+y+z+v+w$, $u^2=x^2+y^2+z^2+v^2+w^2+2xy+2xz+2xv+2xw+2yz+2yv+2yw+2zv+2zw+2vw$; and if the sum of products two in a set=0, $u^2=x^2+y^2+z^2+v^2+w^2$, $w=-\dfrac{xy+xz+xv+yz+yv+zv}{x+y+z+v}$,

$$u^2=x^2+y^2+z^2+v^2+\left(\frac{xy+xz+xv+yz+yv+zv}{x+y+z+v}\right)^2=$$

$$\left[x+y+z+v-\left(\frac{xy+xz+xv+yz+yv+zv}{x+y+z+v}\right)\right]^2.$$

Clearing of fractions and reducing, $[x(x+y+z+v)]^2+y^2(x+y+z+v)^2+z^2(x+y+z+v)^2+v^2(x+y+z+v)^2+(xy+xz+xv+yz+yv+zv)^2=(x^2+y^2+z^2+v^2+xy+xz+xv+yz+yv+zv)^2$. True for three or any greater number of letters.

COMMENT.—In the solution of problem 21, page 163, Vol. II, May No., Dr. Martin uses an ingenuous method for finding a general formula "to find nine integral square numbers whose sum is a square number."

The same formula, expressed for finding n integral square numbers whose sum is a square number, may be produced, more directly, from $(2pq)^2+(p^2-q^2)^2=(p^2+q^2)^2$. Put $p^2=m_1^2+m_2^2+m_3^2+\ldots\ldots+m^2{}_{n-1}$ and $q^2=m^2{}_n$, in which $m_1 m_2, m_3, \ldots\ldots m_n$ represent any n integers.

We readily obtain $(2m_1m_n)^2+(2m_2m_n)^2+(2m_3m_n)^2+\ldots\ldots+(2m_{n-1}m_n)^2+(m_1^2+m_2^2+m_3^2+\ldots\ldots+m^2{}_{n-1}-m^2{}_n)^2=(m_1^2+m_2^2+m_3^2+\ldots\ldots+m^2{}_n)^2$.

Illustration. Let $n=9$, and put $m_1=1$, $m_2=2$, $m_3=3$, $m_4=4$, $m_5=5$, $m_6=6$, $m_7=7$, $m_8=8$, and $m_9=9$. Substituting these values in the formula and dividing by 12, we obtain $1^2+2^2+3^2+4^2+5^2+6^2+7^2+8^2+14^2=20^2$.

PROBMEMS.

37. Proposed by A. H. BELL, Hillsboro, Illinois.

Find the first four, integral values of n in $\dfrac{n(5n-3)}{2}=\square$.

This is the general form of septagonal numbers, 1, 7, 18, 34, 55, etc.

38. Proposed by H. C. WILKES, Skull Run West Virginia.

Let n be any number and let $n^3+1=x$. Then $x^3+(2x-3)^3+(nx-3n)^3=n^3x^3$. How can this be demonstrated; it will always be found true on trial.

39. Proposed by F. P. MATZ, M. Sc., Ph. D, Professor of Mathematics and Astronomy in Irving College, Mechanicsburg, Pennsylvania.

The mth root of the nth power of an *integral* number is a perfect pth power. What is the number?